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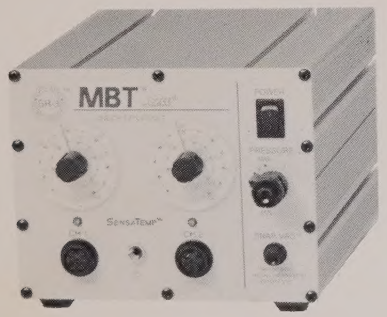
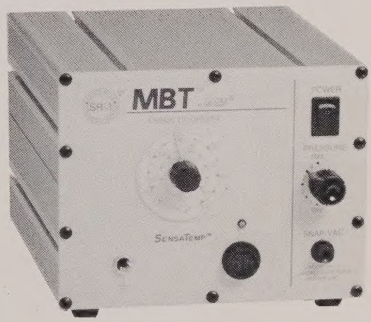
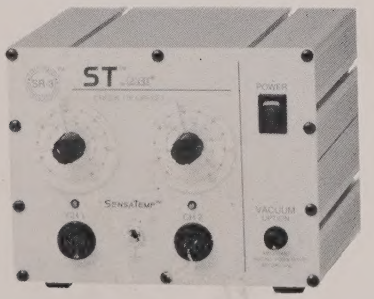
PACE® INCORPORATED

MBT 201, MBT 101, ST 50 SYSTEMS







SERVICE MANUAL

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REV. A

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INCORPORATED
Systems for Development, Production and Repair of Electronic Assemblies

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PACE Incorporated has provided training on all of its products since 1958 as well as advanced technology training in all aspects of hand soldering, rework and repair.

Additional copies of this manual or other PACE literature may be obtained from:

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GENERAL INFORMATION

INTRODUCTION

This manual will assist the technician in performing preventive maintenance and corrective maintenance on the MBT 201, MBT 101 & ST 50 systems. If you should encounter any difficulty correcting a system malfunction, contact PACE Customer Service at TEL: (301) 490-9860, FAX 3016049215.

The MBT 101, MBT 201 & ST 50 Universal Soldering/Desoldering Systems provide the user with the power and versatility to remove and install SMD and Thru-Hole devices. The power source incorporates a highly responsive SensaTemp (closed-loop) temperature control system which provides up to 120 watts of total power to the two output channels on the MBT 201 and ST 50 systems and 60 watts of total power to a single output channel on the MBT 101 systems. The MBT 201 and MBT 101 systems contain an internal motor pump to supply vacuum and air pressure to accessory handpieces whereas the ST 50 systems ar available with a Ped-A-Vac foot pedal option which provides vacuum when connected to an in-house air supply. Accessory handpieces (standard & optional) and special use tips allow the user to remove and replace a wide variety of component configurations.

The MBT 201, MBT 101 and ST 50 systems are available in either the 115 VAC (Domestic) version, 100 VAC (Japan) version or 230 VAC (Export) version. The systems package the power source with a selection of accessories and functional aids. These systems are as follows.

MBT 201 SYSTEM - Consists of PPS 80 (115 VAC, 60 Hz Version) power source, IR-70 High Capacity SMT/Thru-Hole Soldering Iron, SX-70 Sodr-X-Tractor, Dual Handpiece Cubby, PACE's unique Tip & Temperature Selection System and Accessory Kit.

MBT 201J SYSTEM - Consists of PPS 80J (100 VAC, 50/60 Hz Version) power source, IR-70 High Capacity SMT/Thru-Hole Soldering Iron, SX-70 Sodr-X-Tractor, Dual Handpiece Cubby, PACE's unique Tip & Temperature Selection System and Accessory Kit.

MBT 201E SYSTEM - Consists of PPS 80E (230 VAC, 50 Hz Version) power source, IR-70 High Capacity SMT/Thru-Hole Soldering Iron, SX-70 Sodr-X-Tractor, Dual Handpiece Cubby, PACE's unique Tip & Temperature Selection System and Accessory Kit.

MBT 101 SYSTEM - Consists of PPS 75 (115 VAC, 60 Hz Version) power source, SX-70 Sodr-X-Tractor, Handpiece Cubby and Accessory Kit.

MBT 101J SYSTEM - Consists of PPS 75J (100 VAC, 50/60 Hz Version) power source, SX-70 Sodr-X-Tractor, Handpiece Cubby and Accessory Kit.

MBT 101E SYSTEM - Consists of PPS 75E (230 VAC, 50 Hz Version) power source, SX-70 Sodr-X-Tractor, Handpiece Cubby and Accessory Kit.

PETS 5A, 5AE SYSTEMS - PACE Educational Systems contain everything required for step-by-step training in high reliability soldering & desoldering. Consists of MBT 201 or MBT 201E systems plus instructional Videos, Manuals & Skills Kits.

ST 50 & ST 50V SYSTEM - Consists of PPS 11 (115 VAC, 60 Hz Version) power source, IR-70 SMT/Thru-Hole Soldering Iron handpiece, SX-70 Sodr-X-Tractor handpiece and Ped-A-Vac foot pedal (standard on "V" version only), Handpiece Cubby and Accessory Kit.

ST 50J & ST 50VJ SYSTEM - Consists of PPS 75J (100 VAC, 50/60 Hz Version) power source, SX-70 Sodr-X-Tractor handpiece and Ped-A-Vac foot pedal (standard on "V" version only), Handpiece Cubby and Accessory Kit.

ST 50E & ST 50VE SYSTEM - Consists of PPS 75E (230 VAC, 50 Hz Version) power source, SX-70 Sodr-X-Tractor handpiece and Ped-A-Vac foot pedal (standard on "V" version only), Handpiece Cubby and Accessory Kit.

SPECIFICATIONS

POWER REQUIREMENTS

PPS 11 (ST 50/V System)	-	Version operates on 97-127 VAC, 50/60 Hz. 105 Watts, 0.91 Amp typical; 127 Watts, 1.1 Amp maximum
PPS 11J (ST 50V/VJ System)	-	Version operates on 90-115 VAC, 50/60 Hz. 105 Watts, 1.05 Amp typical; 120 Watts, 1.3 Amp maximum
PPS 11E (ST 50V/VE System)	-	Version operates on 196-264 VAC, 50 Hz. 105 Watts, 0.46 Amp typical; 140 Watts, 0.61 Amp maximum
PPS 75 (MBT 101 System)	-	Version operates on 97-127 VAC, 50/60 Hz. 86 Watts, 0.75 Amp typical; 120 Watts, 1.0 Amp maximum
PPS 75J (MBT 101J System)	-	Version operates on 90-115 VAC, 50/60 Hz. 86 Watts, 0.86 Amp typical; 120 Watts, 1.2 Amp maximum
PPS 75E (MBT 101E System)	-	Version operates on 196-264 VAC, 50 Hz. 86 Watts, 0.44 Amp typical; 100 Watts, 0.55 Amp maximum
PPS 80 (MBT 201 System)	-	Version operates on 97-127 VAC, 50/60 Hz. 138 Watts, 1.2 Amp typical; 184 Watts, 1.6 Amp maximum
PPS 80J (MBT 201J System)	-	Version operates on 90-115 VAC, 50/60 Hz. 138 Watts, 1.4 Amp typical; 184 Watts, 1.8 Amp maximum
PPS 80E (MBT 201E System)	-	Version operates on 196-264 VAC, 50 Hz. 138 Watts, 0.6 Amp typical; 199 Watts, 0.9 Amp maximum

VACUUM AND AIR (MBT 201, MBT 101 systems only)

Vacuum Rise Time (except ST 50):	Evacuates 33 cc (2 cubic inch) volume to 25 cm Hg. (10 in. Hg.) in 150 ms.
Vacuum:	51 cm Hg. (20 in. Hg.) (nominal)
Pressure:	.48 Bar (7 P.S.I.) (nominal **MAX** setting)
Air Flow:	13 SLPM (0.46 SCFM) maximum

EOS/ESD

Tip-To-Ground Resistance:	Less than 5 ohms.
AC Leakage:	Less than 2 millivolts RMS from 50Hz to 500Hz.

ENVIRONMENTAL REQUIREMENTS

Operating Temperature: 0°C to 50°C (32°F to 120°F)

Storage Temperature: -40°C to 100°C (-40°F to 212°F)

PHYSICAL PARAMETERS

Dimensions:

MBT 201 systems - 13.5 cm H X 16.5 cm W X 20.3 cm D (5.3 in. H X 6.5 in. W X 8.0 in. D)

MBT 101 systems - 13.5 cm H X 16.5 cm W X 20.3 cm D (5.3 in. H X 6.5 in. W X 8.0 in. D)

ST 50 systems - 13.5 cm H X 16.5 cm W X 12.7 cm D (5.3 in. H X 6.5 in. W X 5.0 in. D)

Weight:

PPS 80 power sources - 3.7 kg. (8.1 lbs.)

PPS 75 power sources - 3.7 kg. (8.1 lbs.)

PPS 11 power sources - 2.7 kg. (6.0 lbs.)

TEMPERATURE OF SENSATEMP HANDPIECES (NOMINAL)

Minimum Setting: 232°C (450°F), nominal.

Maximum Setting: 482°C (900°F), nominal.

Accuracy: 5% of control setting.

Idle Tip Temperature Stability: ±1.1°C (2°F), nominal.

NOTE

Actual minimum and maximum Operating Tip Temperatures may vary depending on handpiece & tip selection.

CAPABILITIES

All capabilities are dependent upon the use of the appropriate Functional Accessories or Work Aids. Available SensaTemp handpieces and their associated assembly and repair functions are listed below (an Operations and Maintenance Manual is provided separately with each handpiece which describes the applications and recommended procedures for that particular tool).

IR-70 High Capacity SMT/Thru-Hole Soldering Iron - Standard handpiece on MBT 201/J/E, MBT 101/J/E & ST 50/J/E systems. Provides a wide range of SMD installation and removal capability as well as unsurpassed thermal performance on heavy, multilayer thru-hole assemblies at safe, lower working temperatures. A wide variety of quick change thru-hole and SMD tips (for chip components, SOTs, SOICs and other components) is available.

SX-70 Sodr-X-Tractor Handpiece - Standard handpiece on MBT 201/J/E, MBT 101/J/E, & ST 50V/J/E systems. Provides thermally enhanced thru-hole desoldering on heavy multilayer assemblies, especially during continuous use. The unique Flo-D-Sodr tip performs safe, continuous SMT land cleaning and preparation. The slim-line, pencil-grip design and finger-actuated vacuum switch allow easy use and manipulation in tight places.

TT-65 ThermoTweez Handpiece - Provides safe, one-handed reflow and removal of PLCCs, LCCCs, chip components and other surface mount components. The thermal capacity and targeted heat quickly removes large SMDs without damage to the board or adjacent components, even on heavy, multilayer assemblies. The unique, vertically oriented design and a wide variety of quick change tips easily reach into tight work areas for safe SMD removal.

TP-65 ThermoPik Handpiece - Provides safe, one-handed reflow and removal of a wide variety of PQFPs and FlatPacks in just seconds. The high thermal efficiency design targets controlled SensaTemp heat directly at the solder joints, away from sensitive substrate areas and adjacent components. The ThermoPik's self-adjusting integral vacuum pick and unique design provide easy, one-handed operation.

TJ-70 Mini ThermoJet Handpiece - Provides safe, rapid installation of SMDs including chip components, SOTs, SOICs, PLCCs, LCCCs and FlatPacks. The slim-line design and precision focused air flow lets you easily target controlled heat right at the solder joints without damaging the board or adjacent components. A finger-actuated air switch and SensaTemp control provide safe, "on-demand" capability without constant running of the air pump. Cannot be used with ST 50/J/E systems. Replaces TJ-65 Mini ThermoJet handpiece.

NOTE

The MBT 201 and MBT 101 and ST 50 products feature PACE's unique SensaTemp closed loop temperature management system which will function only with the SensaTemp handpieces listed above. Do not attempt to use any other handpiece. Likewise, use SensaTemp handpieces on only those systems with a SR-3 or SR-4 rating (marked on Front Panel of Power Source). These include other MBT systems (MBT 101, MBT 201 and higher) and all ST series systems.

GENERAL INFORMATION

PARTS IDENTIFICATION

1. **POWER SWITCH** - Turns system ON ("1") and OFF ("0"); controls input power to system.
2. **CH 1 VARIABLE TEMPERATURE CONTROL** - Allows the operator to adjust the tip temperature for handpiece/tip combination connected to channel 1.
3. **CH 2 VARIABLE TEMPERATURE CONTROL** (MBT 201 & ST 50 Systems Only) - Allows the operator to adjust the tip temperature for handpiece/tip combination connected to channel 2.
4. **CH 1 POWER RECEPTACLE** - Provides power, tip ground, sensing circuitry and finger switch connection from MBT system to the handpiece connected to channel 1.
5. **CH 2 POWER RECEPTACLE** (MBT 201 & ST 50 Systems Only) - Provides power, tip ground, sensing circuitry and finger switch connection from MBT system to the handpiece connected to channel 2.
6. **CH 1 LED** - Green LED provides visual indication of duty cycle control of channel 1. Indicator lights as power is applied to the connected handpiece.
7. **CH 2 LED** (MBT 201 & ST 50 Systems Only) - Green LED provides visual indication of duty cycle control of channel 2. Indicator lights as power is applied to the connected handpiece.
8. **SNAP-VAC PORT (VACUUM OPTION** Port on ST 50 systems) - Quick connect fitting which provides quick-rise vacuum for Sodr-X-Tractor or ThermoPik handpieces.
9. **CONTROLLABLE PRESSURE PORT** - Quick connect fitting with adjustable valve which provides variable air flow for Sodr-X-Tractor handpiece (in Hot Jet Mode) and Mini ThermoJet handpiece. Not present on ST 50 systems.
10. **EARTH GROUND RECEPTACLE** - Provides positive earth ground to which a ground cable can be connected from the workpiece or work surface as part of a static control program.
11. **HOT CUBBY** - Holder and cleaning station for handpiece(s). Configuration of cubby is applicable to the handpieces(s) purchased.
12. **TIP & TEMPERATURE CHART HOLDER** - Holds PACE'S Tip & Temperature Selection System Charts (standard accessory on MBT 201 & ST 50 systems) which enable the operator to accurately set true, correct operating tip temperature for any handpiece/tip configuration.
13. **POWER CORD** - Provides main power to system from AC outlet to AC Power Receptacle.
14. **AC POWER RECEPTACLE/FUSE HOLDER** - Receptacle for providing power to the system from AC outlet through power cord, and location of fuse which protects system from overcurrent conditions.
15. **FUSE** - Provides overload protection for MBT system.

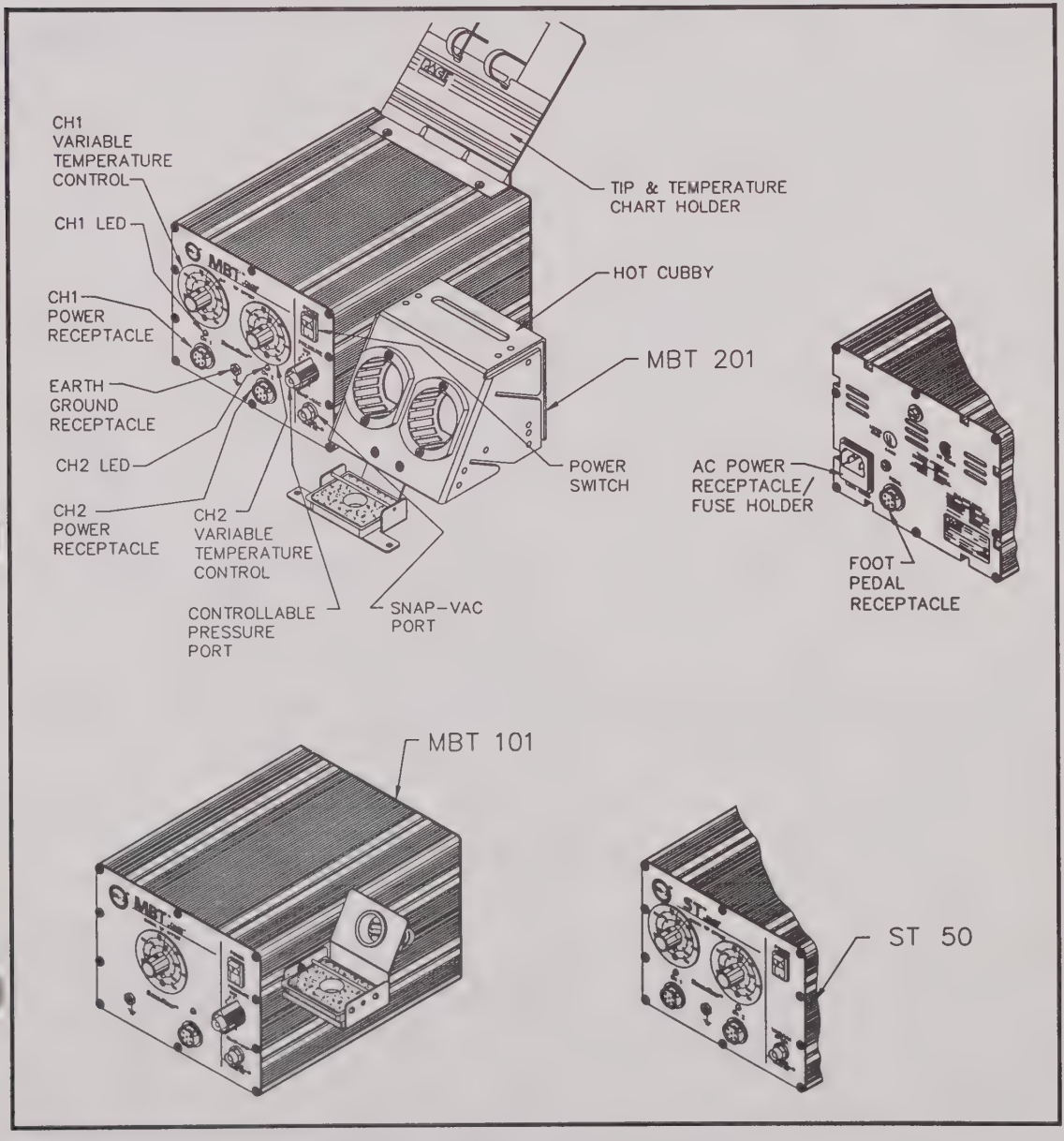


Figure 1. Parts Identification

SAFETY

The purpose of this "SAFETY" section is to inform users of the heading guidelines used in this manual to indicate special Notes, Cautions, Warnings or Dangers. Also included are recommended precautions which must be observed when operating or servicing this product.

HEADING GUIDELINES

PACE adheres to the following Heading Guidelines (based on OSHA guidelines) when listing special information or precautions to be taken. Especially important are all procedures and practices which, if not strictly observed, could result in injury or loss of life.
These "NOTES", "CAUTIONS","WARNINGS" and "DANGERS" are inserted in this manual whenever deemed necessary. They appear in a blocked off form with double outline and a shaded background to highlight the information as shown below.

NOTE

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

NOTE

Used to indicate a statement of company recommendation or policy. The message may relate directly or indirectly to the safety of personnel or protection of property. NOTE is not associated directly with a hazard or hazardous situation and is not used in place of "CAUTION", "WARNING" or "DANGER".

CAUTION

Used to indicate a hazardous situation which may result in minor or moderate injury. May also be used to alert personnel to conditions, procedures and practices which, if not observed, could result in damage to or destruction of the product or other equipment.

WARNING

Used to define additional information that if not closely followed might result in serious damage to equipment and represent a potential for serious personnel injury.

DANGER

Defines additional information that if not closely followed might result in severe personnel injury or death. Danger is not used for property damage unless personal injury risk is present.

PRECAUTIONS

The following are general safety precautions which personnel must understand and follow when using or servicing this product. These precautions may or may not be included elsewhere in this manual.

USEAGE PRECAUTIONS

CAUTIONS

1. SensaTemp handpiece heaters and installed tips are hot when handpiece is powered on. DO NOT touch either the heater or tip. Severe burns may result! Always store handpiece in the appropriate cubby when not in use.
2. Always use this system in a well ventilated area. A fume extraction system such as those marketed by PACE are highly recommended to protect personnel from solder flux fumes.
3. Exercise proper precautions when using chemicals (e.g., solder paste). Refer to the Material Safety Data Sheet (MSDS) supplied with each chemical and adhere to all safety precautions recommended by the manufacturer.

NOTES

1. The solder collection chamber in the PACE Sodr-X-Tractor is made of glass. Never remove this chamber using pliers. Breakage of the chamber may result. Always remove using the procedures recommended by PACE in the associated handpiece manual.
2. The glass solder collection chamber in the PACE Sodr-X-Tractor is hot when the handpiece is in use. When removing the chamber for cleaning, never touch the glass with bare hands. Allow the chamber to cool before cleaning.
3. Always store any connected handpiece in the appropriate cubby.

SERVICING PRECAUTIONS

DANGERS

POTENTIAL SHOCK HAZARD - Repair procedures performed on these products should be performed by qualified service personnel only. Line voltage parts will be exposed when equipment is disassembled. Service personnel must avoid contact with these parts when troubleshooting the power source.

NOTES

To insure continued peak performance. Use genuine PACE replacement parts.

REPAIR PROCEDURE

The "REPAIR" section of this manual provides the technician with the information necessary to determine the source and take the necessary steps to correct the malfunction of a unit. In order to perform the most expedient repair, the technician must follow the process listed below step by step, in order. Failure to do so will make the repair much more difficult.

1. PERIODIC MAINTENANCE - No periodic or special maintenance is required on these systems.

2. SERVICE HINTS - Read these helpful hints which give information on operation and troubleshooting.

3. CORRECTIVE MAINTENANCE - A guide for resolving malfunctions caused by improper maintenance or handpiece failure. Locate the "Symptom" in the "Corrective Maintenance" section which best describes the malfunction of the failed unit. Check each point described under "Solution" in order of listing.

4. CALIBRATION - Lists procedures for performing tip temperature tests to check handpieces and calibration of units. Perform these procedures if operating tip temperatures appear to be incorrect or periodically to ensure calibration maintenance.

5. DISASSEMBLY/REASSEMBLY - Contains Disassembly/Reassembly instructions which enables the technician to disassemble and reassemble the unit properly.

6. FLOW CHARTS & WIRING DIAGRAMS - Easy to follow Flow Charts and Wiring Diagrams which enable the technician to determine the source of a malfunction down to an assembly (e.g., Main PCB Assembly) level. Locate the Flow Chart which best describes the malfunction of the failed unit. Follow the instructions on the Flow Chart and perform the checks indicated to determine the source of the malfunction.

7. PACE CUSTOMER SERVICE - If the cause for the malfunction has not been determined at this point, call PACE Customer Service at TEL:(301) 490-9860, FAX 3016049215.

DANGER

POTENTIAL SHOCK HAZARD - Repair Procedures are to be performed by qualified service personnel only. Removal of the power source panels exposes line voltage parts. Service personnel must insure that the AC Power Cord is disconnected prior to disassembly.

SERVICE HINTS

1. FUSE FAILURES: Failures are usually caused by shorts in the handpiece. Always check each connected handpiece using the "Heater Assembly Checkout Procedures" table before replacing the fuse.

> **NOTE**
>
> Insure that the replacement fuse is the proper value for the power source. Refer to the "Power Source Replacement Parts" table.

2. VACUUM FAILURES: Failures of this nature can be caused by either the unit or the handpiece. Remove the air hose (and attached VisiFilter) from the **SNAP-VAC** (or **VACUUM OPTION**) Port and check for vacuum at the port. If sufficient vacuum is present, the malfunction exists in the handpiece. Further, if vacuum is sufficient at the port, check the vacuum level at the end of the glass solder collection chamber (Sodr-X-Tractor handpieces only, chamber must be checked cold). Take the applicable steps shown following.

   a) Handpiece Failures: Replace VisiFilter if necessary; clean heater bore and replace tip, check air hose for holes and ensure that glass solder collection chamber (Sodr-X-Tractor handpieces only) is properly seated against heater seal.

   b) Unit Failures: Remove the unit front panel (see "Disassembly/Reassembly"). Check internal hosing for kinks and replace internal VisiFilter (attached to pressure port on motor pump assembly).

3. HEATING CONTROL CIRCUITS: Must be checked under load (with handpiece/s plugged in). The output(s) are obtained by switching triacs on and off. The voltage level to the handpiece(s) does not change when adjusting the Variable Temperature Control knob(s). Temperature level is achieved by varying the number of "on" cycles that the voltage is applied as opposed to the number of cycles "off". The control circuit of the unit varies the duty cycle of voltage application as required to achieve and maintain the set temperature of the handpiece.

4. HEATING FAILURES: Usually caused by defective handpiece heaters. In normal operation, the channel LED will turn hard on until the preset temperature is reached, will blink when at temperature and will be off when temperature is higher than the set temperature (when reducing set temperature). If the channel LED is always hard on or never lights, the handpiece heater assembly is probably defective. Refer to the "Heater Assembly Checkout Procedures" table.

CORRECTIVE MAINTENANCE

VISIFILTER REPLACEMENT

Replace the VisiFilter when it becomes clogged or discolored. To replace the VisiFilter, follow the procedure listed below.

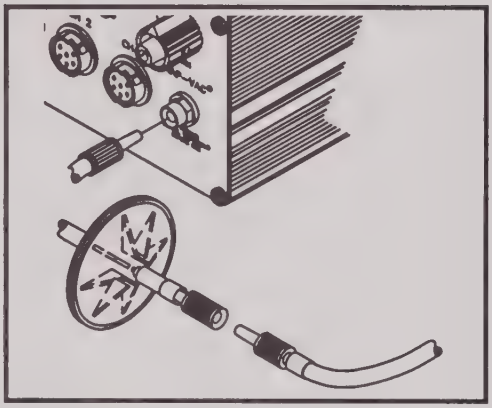


FIGURE 2. VISIFILTER REPLACEMENT

1. Disconnect the handpiece air hose by gently pulling and turning the coupled fittings.

2. Disconnect the VisiFilter and hose assembly from the power source by gently turning and pulling the male fitting inserted ino **SNAP-VAC** (or **VACUUM OPTION**) Port.

3. Disconnect VisiFilter from both attached 1 inch hoses by gently pulling and turning the VisiFilter while holding each of the hoses.

NOTE

When removing any air hose, pull and turn to remove. DO NOT attempt to pull hose directly off. Damage to or breakage of VisiFilter or fittings may occur.

4. Discard old or discolored VisiFilter.

5. Gently push and turn both 1 inch hoses onto new VisiFilter.

6. Attach VisiFilter and hose assembly to power source by inserting male fitting into **SNAP-VAC** (or **VACUUM OPTION**) Port.

7. Reinstall air hose by gently pushing and turning the ridged end of the male fitting into the air hose and the other end into the female fitting attached to the VisiFilter.

HANDPIECES

The following "Heater Assembly Checkout Procedures" are applicable to all PACE SensaTemp handpieces except for the TT-65 ThermoTweez handpiece. Refer to either of the TT-65 manuals (P/N 5050-0300 or 5050-0336) for troubleshooting procedures pertinent to that handpiece.

Perform the "Heater Assembly Checkout Procedures" with the handpiece (and heater) at room temperature. If the handpiece is warm, resistance readings will be different from those shown.

SYMPTOM	CHECKOUT PROCEDURE	CAUSE	SOLUTION
No heat	Check resistance - Pin 2 to Pin 5. Refer to "Heater Specifications" column. If resistance is high -	Open Heater	Replace Heater Assembly.
	Check resistance - Pin 3 to Pin 6. If circuit reads open -	Open Sensor	Replace Heater Assembly.
Handpiece overheating	Check resistance - Pin 3 to Pin 6. Resistance should be 110 ohms. If the measured resistance is less than 105 ohms -	Shorted Sensor	Replace Heater Assembly.
Fuse blows when unit is turned on.	Check resistance - Pin 2 to Pin 5. Refer to "Heater Specifications" column. If resistance is low -	Solder short in Handpiece.	Remove Short. Replace Heater Assembly & Fuse F1.
		Shorted Heater	Replace Heater Assembly & Fuse F1.
No Ground on Tip.	Check resistance - Pin 4 to a NEW Tip. Resistance should be less than 2 ohms. If not -	Oxidation buildup in Heater Bore.	Clean Heater Bore using appropriate wire brush.
		Defective Heater	Replace Heater Assembly.

HEATER SPECIFICATIONS
SX-70 = 8 - 10 ohms
IR-70 = 8 - 10 ohms
TP-65 = 9 - 11 ohms
TJ-65 = 7 - 9 ohms
TJ-70 = 6 ohms

TABLE I. HEATER ASSEMBLY CHECKOUT PROCEDURES

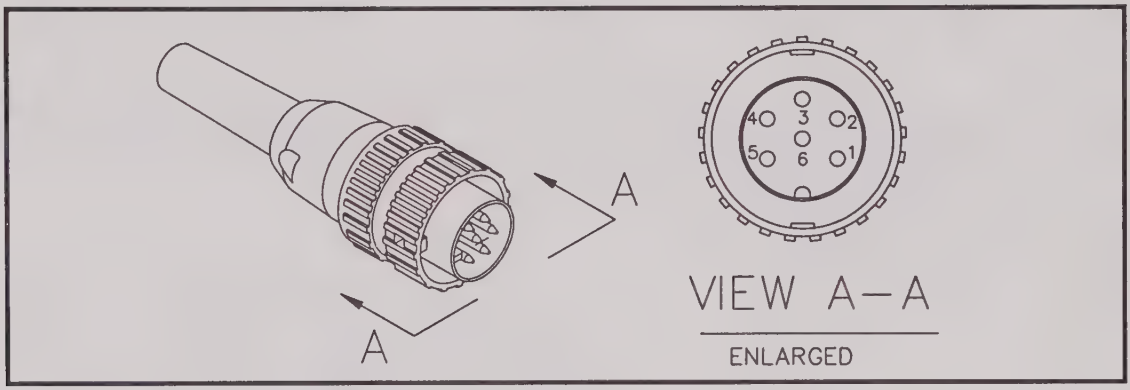


FIGURE 3. CONNECTOR PLUG WIRING

POWER SOURCE

Most malfunctions are simple and easy to correct. Refer to the table shown below to clear these malfunctions.

SYMPTOM	PROBABLE CAUSE	SOLUTION
No power to system.	Blown Fuse (F1)	Disconnect all handpieces. Replace fuse F1 located on rear of Power Source in the AC Receptacle/Fuse Holder.
	Blown Fuse(F1) caused by defective handpiece.	If fuse blows when handpiece is plugged in, see Table 1 or refer to the applicable handpiece manual. Replace the fuse.
No heat on handpiece. Other handpieces work on Power Source channel.	Defective Heater	See Table 1 or refer to applicable handpiece manual.
No heat on handpiece. Other handpieces do not work on Power Source channel.	Defective control circuit.	Refer to "Troubleshooting" section Heat Output flow chart or Contact PACE Customer Service.

TABLE II. POWER SOURCE CORRECTIVE MAINTENANCE

PED-A-VAC FOOT PEDAL

If the foot pedal assembly does not work properly (e.g., loss of vacuum), clearing of the flux and air line contaminants from the assembly and replacement of key parts will, in most cases, restore efficient operation. Install Ped-A-Vac Overhaul Kit (PACE P/N 6993-0043) using the instructions supplied.

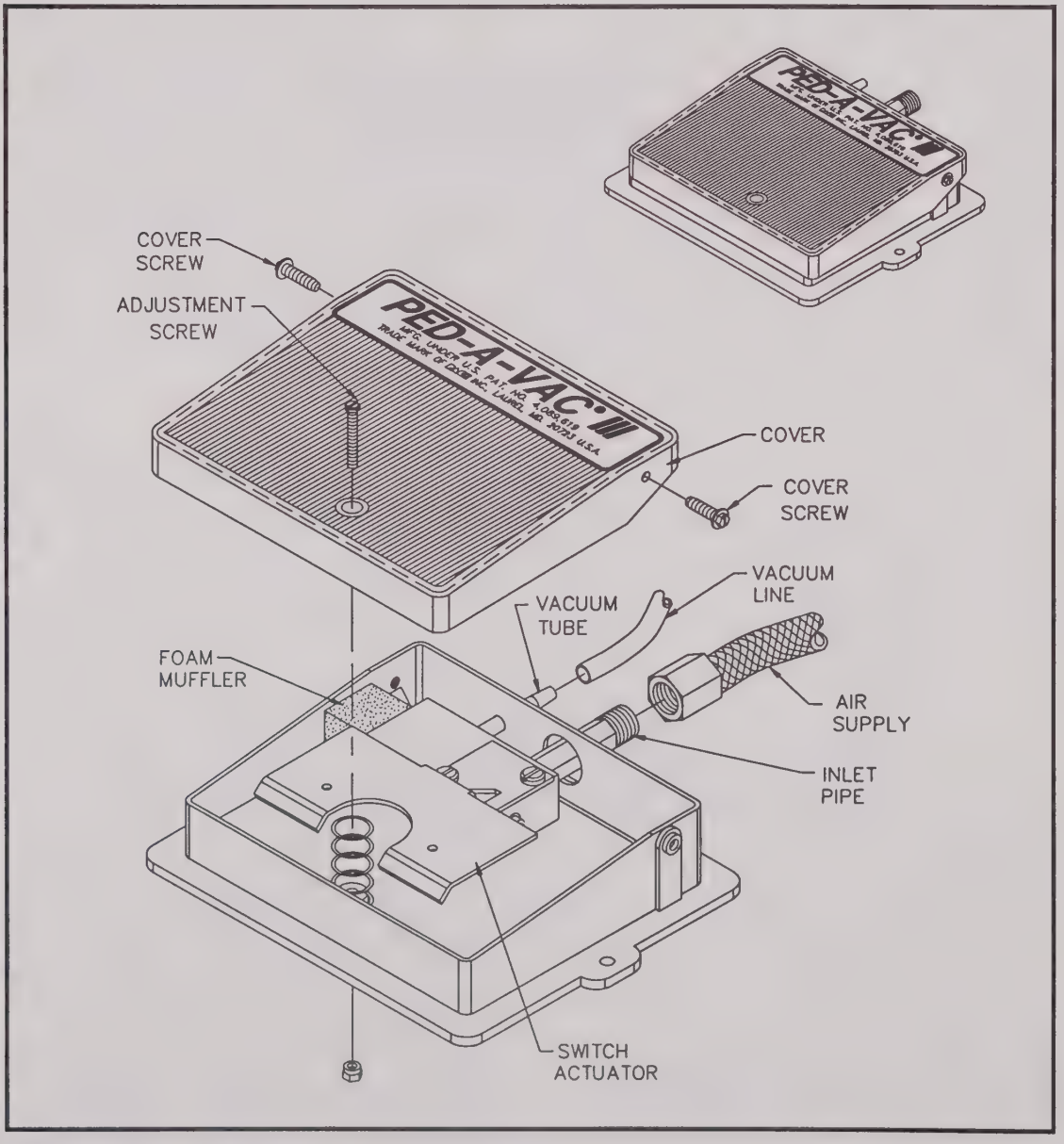


FIGURE 4. PED-A-VAC FOOT PEDAL

CALIBRATION

All PACE SensaTemp controllers can be checked for calibration without the need to adjust any internal controls. If there is a requirement to check the actual tip temperature of a SensaTemp handpiece, perform the following procedure for attaching a thermocouple wire to the handpiece tip. A Process Monitor is available from PACE which will provide a temperature readout and can perform a variety of additional tests such as Tip to Ground resistance and vacuum checks.

The only adjustment which can be made by a technician is the temperature control knob(s). The knob(s) may be adjusted by setting the actual tip temperature (as measured in the procedure below) to the level normally used by the operator. Loosen the knob set screw and adjust the knob pointer to match the readout on the dial setting with that of the temperature measuring instrument; then tighten the set screw to secure.

A thermocouple may be attached to a tip by spot welding a thermocouple wire onto the end of the tip or by embedding the wire into a drilled hole at the tip end. Either method will produce accurate results.

MATERIALS REQUIRED

1. **PACE Process Monitor or Temperature Meter**
2. **Soldering Iron Tip.** Listed below are the available tips PACE uses (with and without embedded thermocouples).
   a) Use PACE part number 7021-0004-P1 tip with embedded thermocouple or tip only part number 1121-0337 on handpieces with 4.76 mm (3/16 inch) heater bore.
   b) Use PACE part number 7021-0003-P1 tip with embedded thermocouple or tip only part number 1121-0130 on handpieces with 3.18 mm (1/8 inch) heater bore.

NOTE
When using tips with embedded K type thermocouples supplied by PACE with a K type temperature meter, a PACE part number 1332-0164-P1 RCA to Omega style, K type, thermocouple adapter must be used.

The following items are needed if you are NOT using the PACE part number 7021-0003-P1 or 7021-0004-P1 embedded tips.

3. **Thermocouple**, 30 AWG ("K" type when using Process Monitor or type compatible with Temperature Meter)
4. **Copper Wedge** (used when embedding thermocouple) or 16 AWG Bare Copper Wire (1.22 mm (.048 inch) O.D.)
5. **Drill Bit** (used when embedding thermocouple), 1.5 mm (.059 inch) diameter

SPOT WELDING PROCEDURE

1. Place the thermocouple end onto the tip just past the tinned end (approximately 6.35 mm (.25 inch)).
2. Spot weld the thermocouple to the tip. Check to insure that the thermocouple is properly attached to the tip.

EMBEDDING PROCEDURE

1. Drill a 1.5 mm (.059 inch) hole just past the tinned end of the Solder Tip (approximately 6.35 mm (.25 inch) when using one of the recommended PACE tips). Drill to a depth of 2.54 mm (.100 inch).

2. Place the end of the Thermocouple wire into the hole. Ensure that the end of the wire bottoms out in the hole.

3. Wedge the Thermocouple into place using the copper wedge or bare copper wire. The Thermocouple should be wedged as air tight as possible.

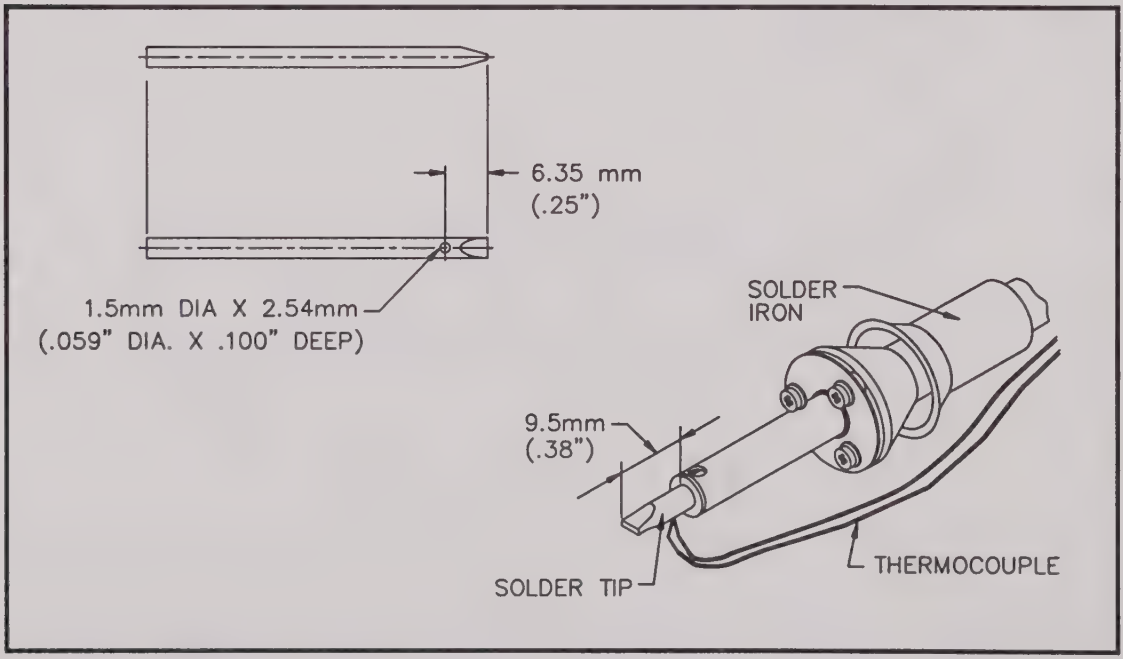


FIGURE 5. THERMOCOUPLE ATTACHMENT

TIP TEMPERATURE TEST

1. Install the tip into the handpiece to be tested with the end of the tip properly seated. The recommended PACE tips are shown extending out of the heater 9.5mm (.375 inch).
2. Connect the free end of the thermocouple wire to the PACE Process Monitor (or temperature meter).
3. Apply power to the handpiece and allow temperature to stabilize.

DISASSEMBLY/REASSEMBLY

DISASSEMBLY

To disassemble the unit for servicing, perform the following procedure step by step, in sequence using the illustrations as a guide. The procedure directs the technician to remove the unit from the chassis. The unit pictured is a PPS 80; the PPS 75 and PPS 11 units are assembled in the same manner. Position of the motor pump and air hose routing may not be indicative of your system.

DANGER

POTENTIAL SHOCK HAZARD - The following procedures are to be performed by qualified service personnel only. Removal of the power source exposes line voltage parts. Service personnel must insure that the AC Power Cord is disconnected prior to disassembly.

1. Place the unit on a suitable work surface. Insure that the power cord has been disconnected from the back of the power source.

2. Remove the 10 Front Panel mounting screws.

3. Pull the Front Panel forward 3 inches.

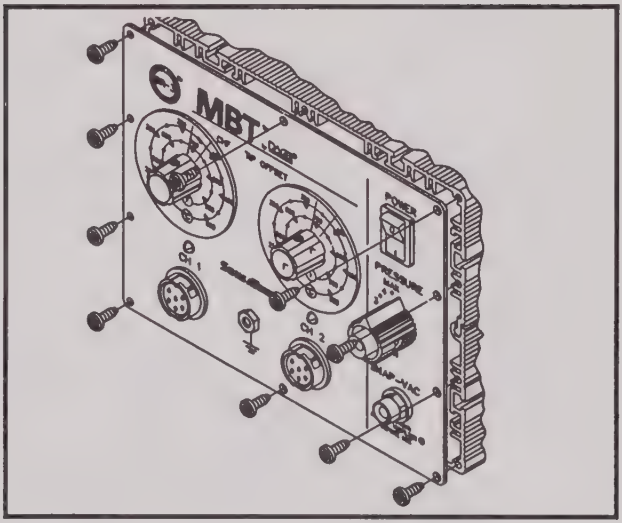


FIGURE 6. REMOVING FRONT PANEL

4. Reposition the unit with the rear of the unit facing forward.

5. Remove the single hex head screw and the 8 Rear Panel mounting screws.

6. Pull the Rear Panel forward 2 inches and lay face down on the work surface.

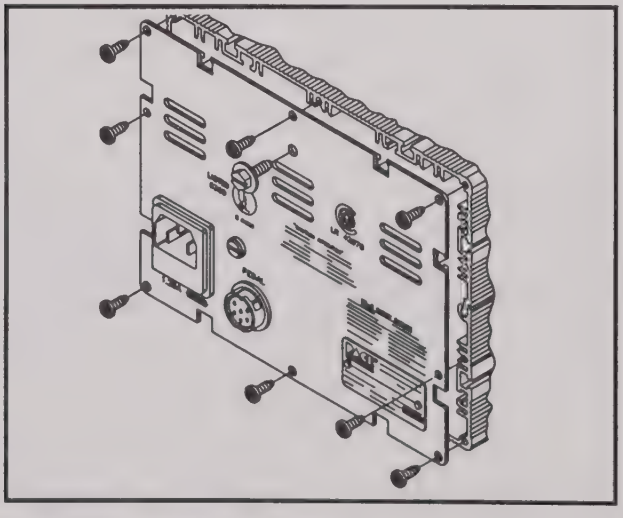


FIGURE 7. REMOVING REAR PANEL

7. Take note of all cabling attached to the PC Board and unplug each connection.

8. Remove any hosing connections on the Front Panel assembly.

9. Remove the PC Board by carefully sliding it out through the rear of the unit.

10. Set the PC Board aside.

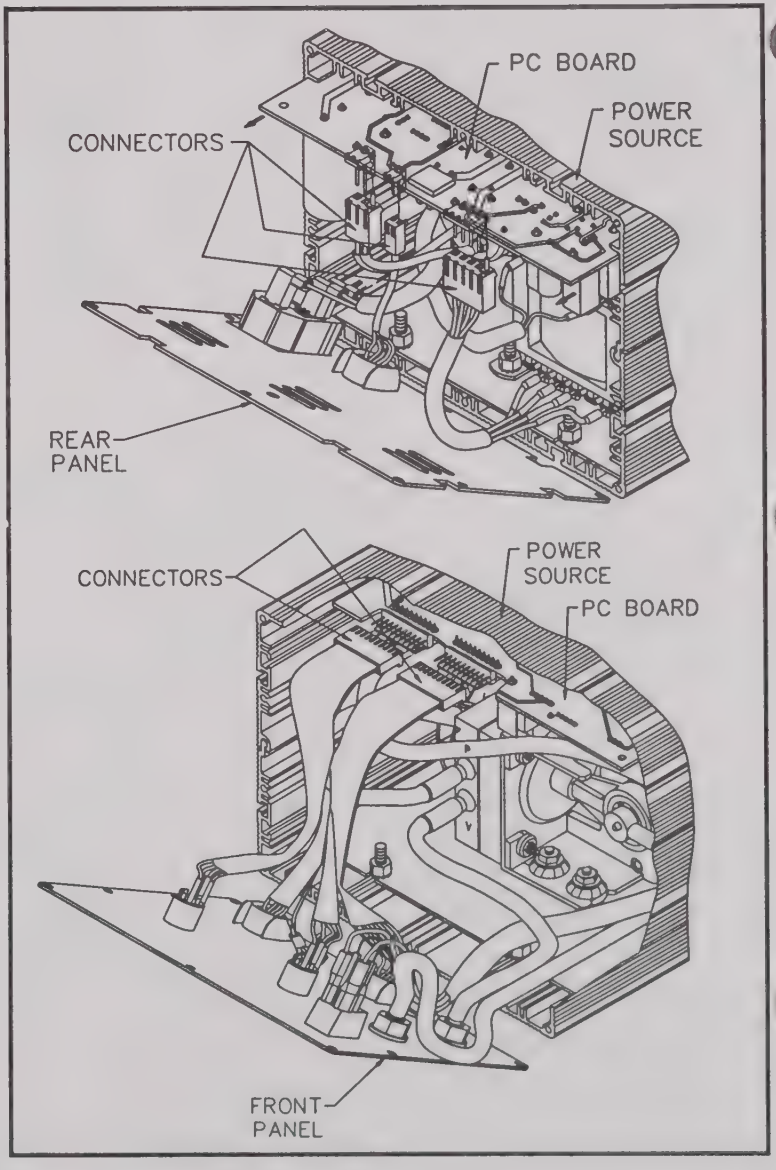


FIGURE 8. REMOVING PC BOARD

11. There are 4 mounting screws with locking nuts which secure the Transformer Assembly to the chassis. Two are located on the front base of the unit and 2 are located on the rear base. One rear mounting screw secures Green grounding wires. Loosen each of the 4 locking nuts. Remove the Green wires and slide the nuts and screws out of the unit.

12. Slide the transformer assembly out of the front of the power source chassis.

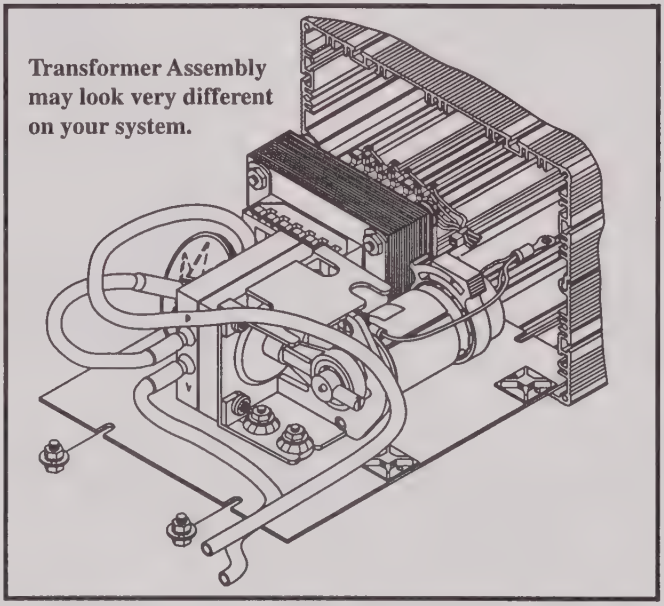


FIGURE 9. REMOVING TRANSFORMER ASSEMBLY

13. Carefully place the PC Board on top of the transformer assembly and reconnect panel cabling and hoses removed in steps 7 and 8 (see Figure 8). Note that if the system has 2 hoses, the lower hose connects to the **SNAP-VAC** Port (or **VACUUM OPTION** Port). Check to insure that the PC Board is not shorting to the transformer or motor pump assembly.

14. The unit can now be connected to the house AC supply to troubleshoot system.

REASSEMBLY

1. Disconnect the AC power cord.

DANGER
POTENTIAL SHOCK HAZARD - Insure that the AC power is disconnected before proceeding to step 2.

2. Disconnect the PC Board, hosing and panel connections. Slide the transformer assembly and PC Board back into the chassis and reconnect in reverse order of the Disassembly procedure. Insure that the following precautions are taken in the process.

   a) Insure that the rear edge of the transformer assembly plate is flush with the rear of the chassis.

   b) When reconnecting cabling, insure that all wiring connections are correct.

   c) When reinstalling the Front Panel assembly, insure that the hose(s) are attached and do not kink when the panel is screwed to the chassis.

3. Check unit for proper operation.

FLOW CHARTS

The following flow charts should be used to determine the source of a malfunction down to an assembly level. Locate the flow chart which best describes the malfunction.

NO POWER

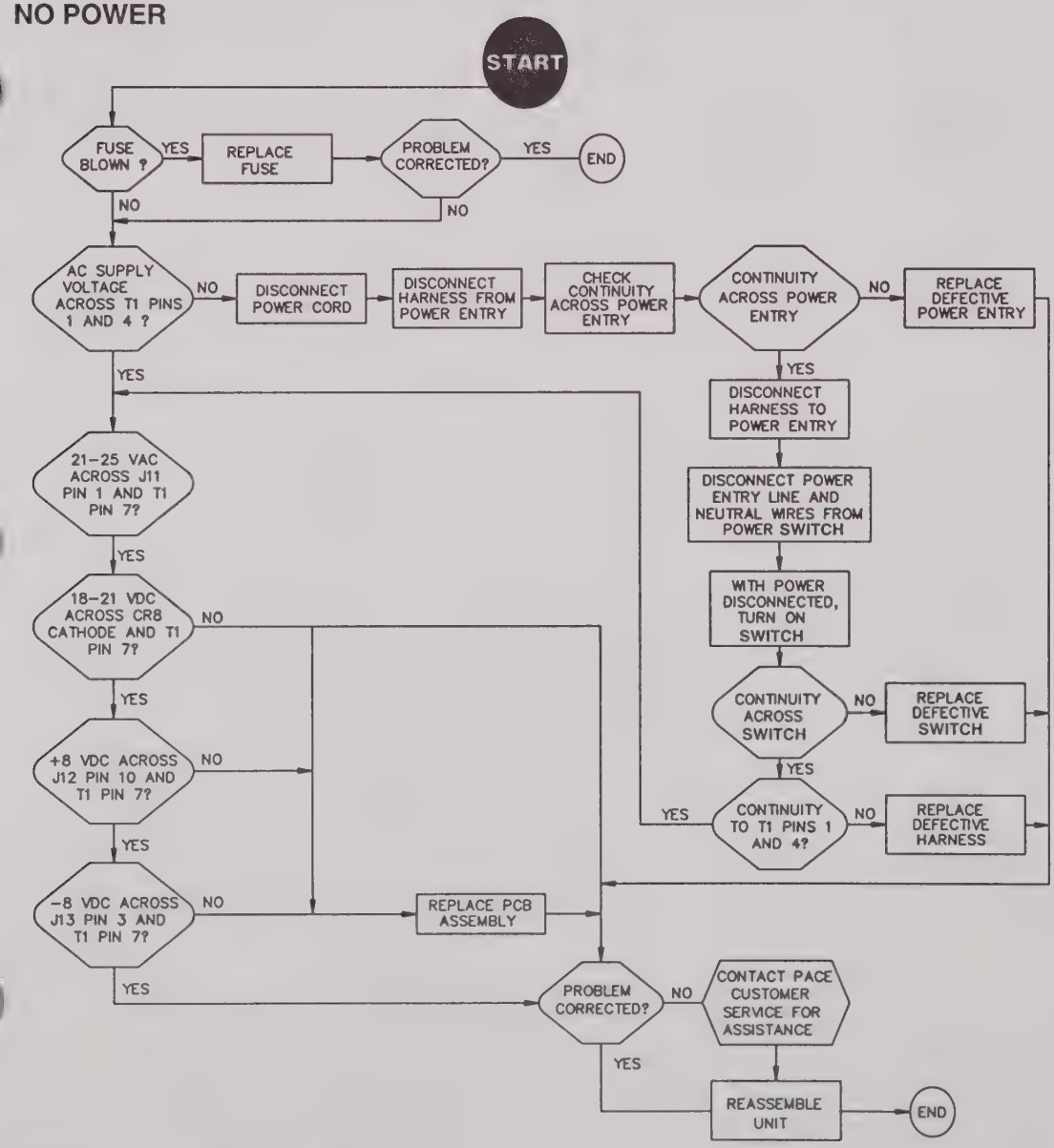


FIGURE 10. NO POWER FLOW CHART

HEAT OUTPUT

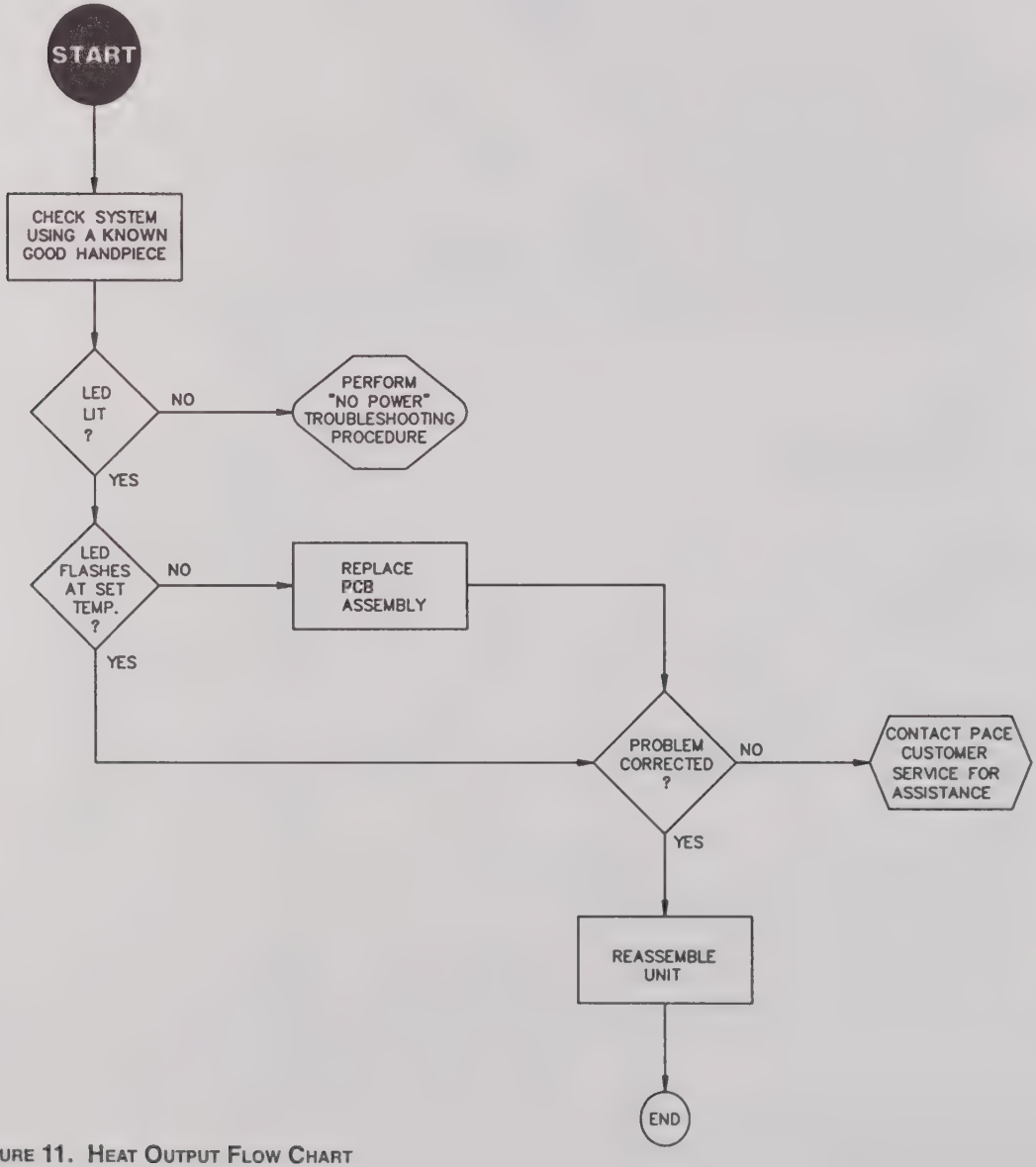


FIGURE 11. HEAT OUTPUT FLOW CHART

MOTOR MALFUNCTION

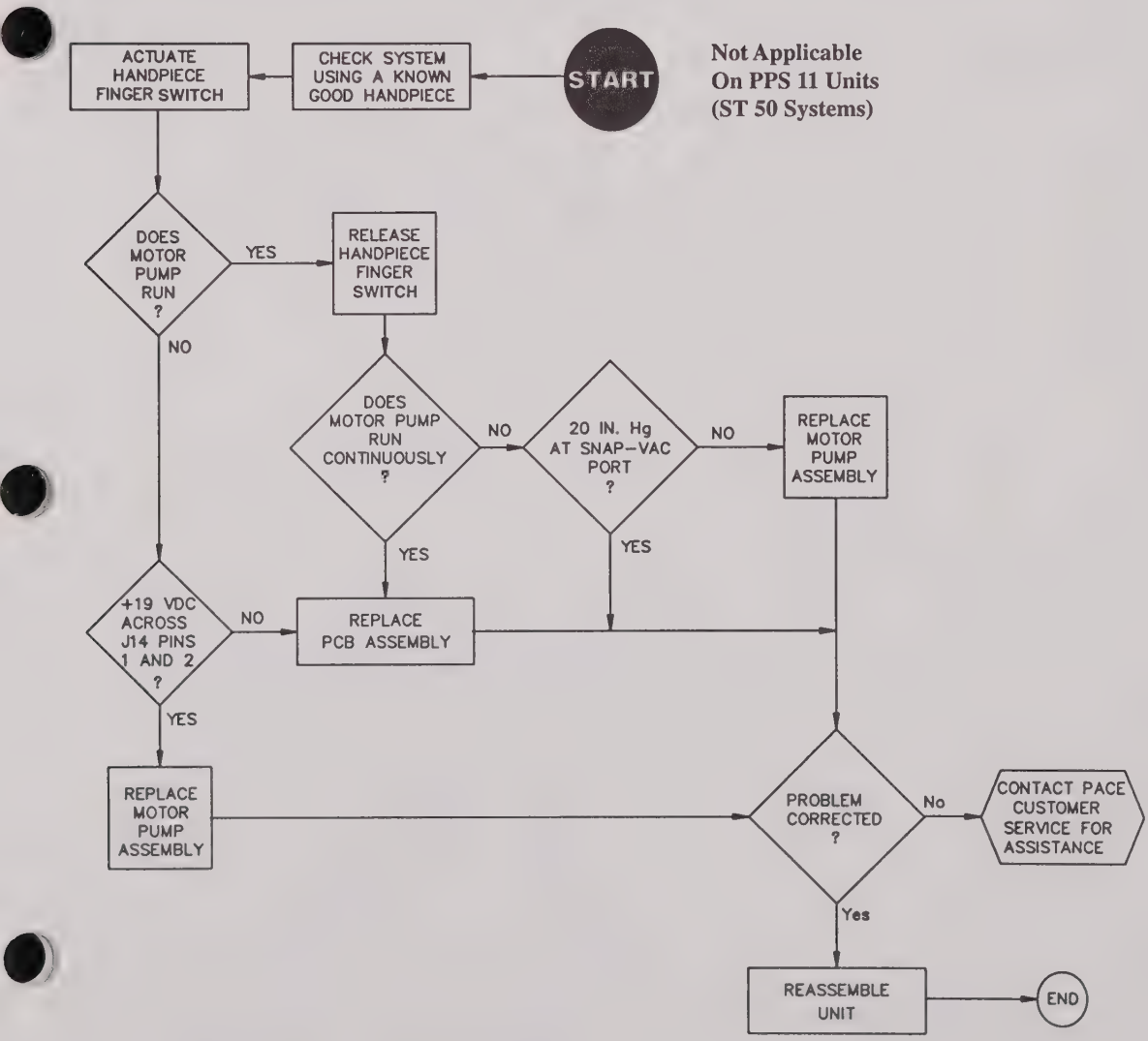


FIGURE 12. MOTOR MALFUNCTION FLOW CHART

WIRING DIAGRAMS

PPS 80 POWER SOURCES

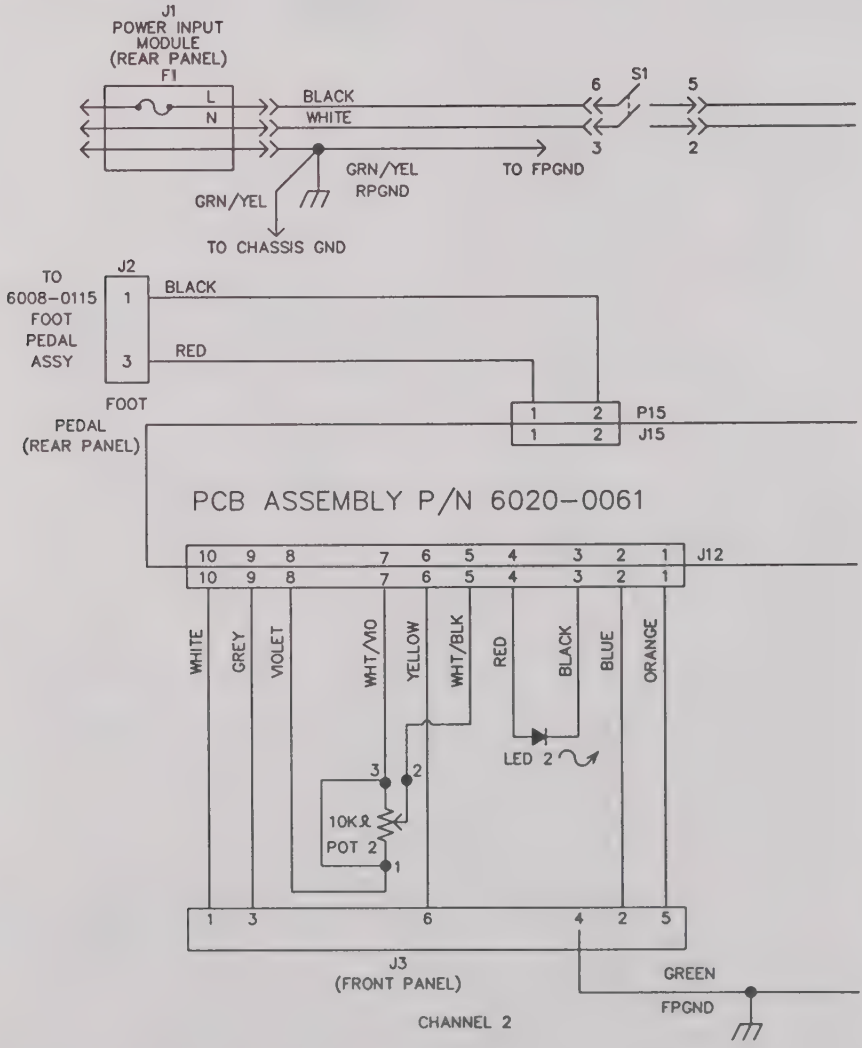
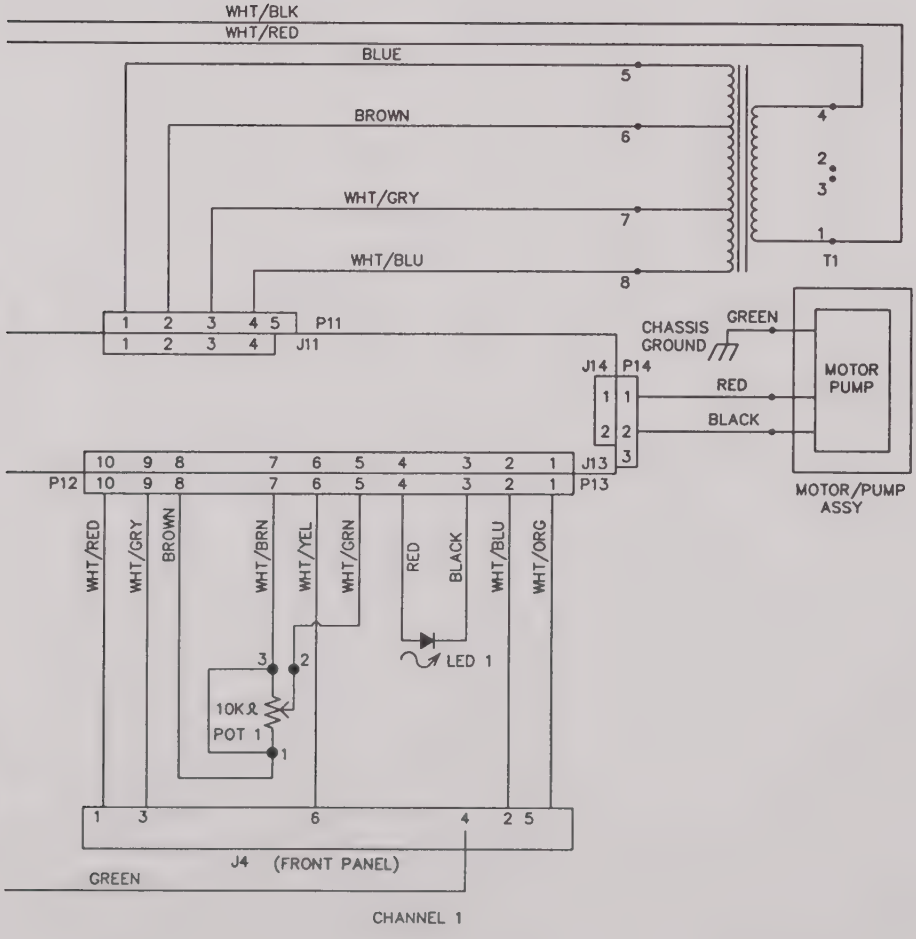


FIGURE 13. PPS 80 POWER SOURCES WIRING DIAGRAM


WHT/BLK
WHT/RED
BLUE
BROWN
WHT/GRY
WHT/BLU
5
6
7
8
4
2
3
1
T1
1 2 3 4 5 P11
1 2 3 4 J11
CHASSIS GROUND
GREEN
J14 P14
1 1
2 2
3
RED
BLACK
MOTOR PUMP
MOTOR/PUMP ASSY
10 9 8 7 6 5 4 3 2 1 J13
P12 10 9 8 7 6 5 4 3 2 1 P13
WHT/RED
WHT/GRY
BROWN
WHT/BRN
WHT/YEL
WHT/GRN
RED
BLACK
WHT/BLU
WHT/ORG
LED 1
10K Ω
POT 1
1 3 6 4 2 5
J4 (FRONT PANEL)
GREEN
CHANNEL 1

PPS 75 POWER SOURCES

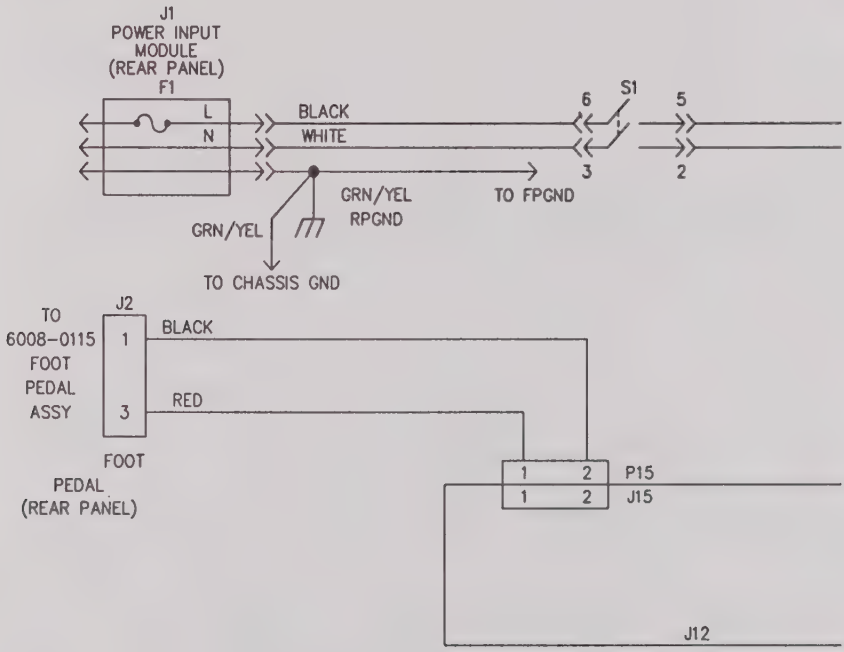
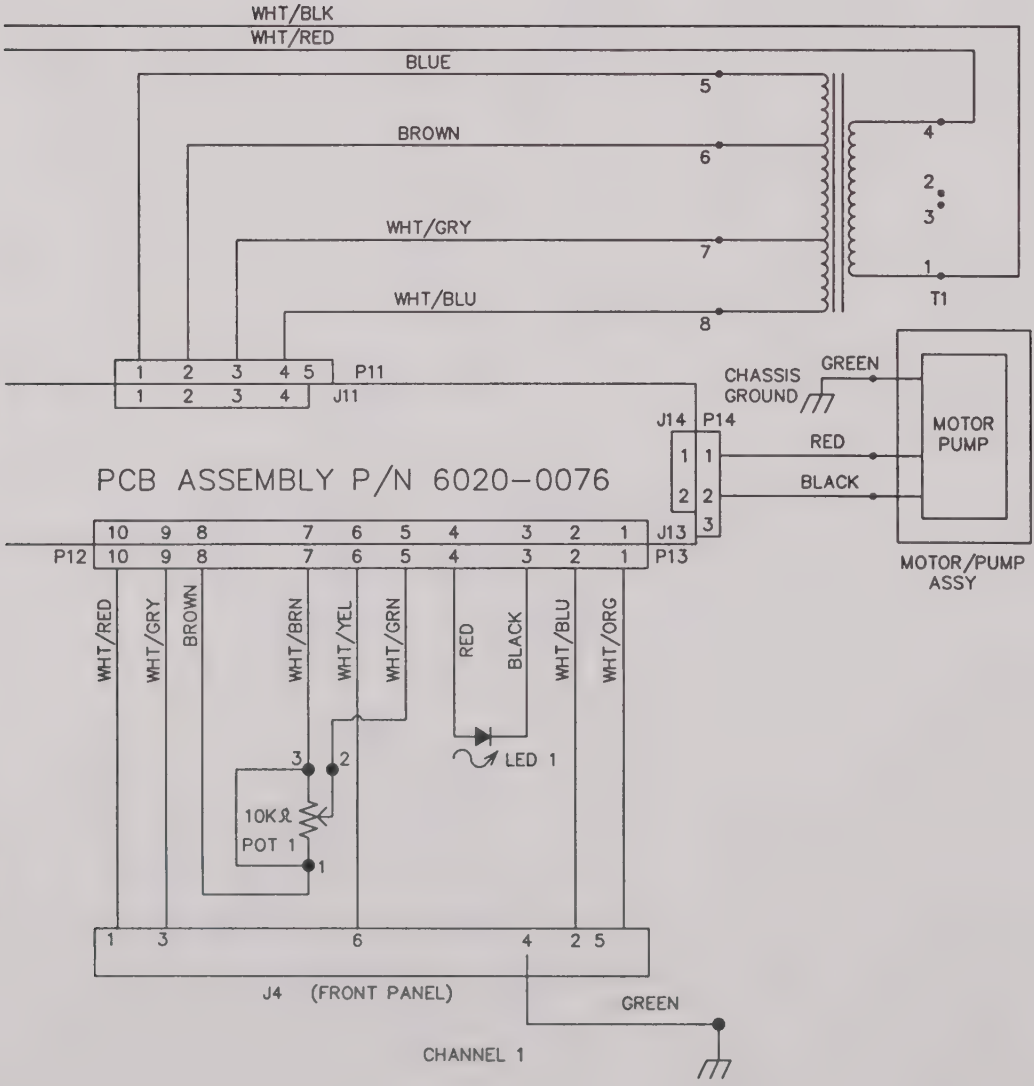


FIGURE 14. PPS 75 POWER SOURCES WIRING DIAGRAM


WHT/BLK
WHT/RED
BLUE
BROWN
WHT/GRY
WHT/BLU
5
6
7
8
4
2
3
1
T1
1 2 3 4 5 P11
1 2 3 4 J11
CHASSIS GROUND
GREEN
J14 P14
1 1
2 2
3
RED
BLACK
MOTOR PUMP
MOTOR/PUMP ASSY
PCB ASSEMBLY P/N 6020-0076
10 9 8 7 6 5 4 3 2 1 J13
P12 10 9 8 7 6 5 4 3 2 1 P13
WHT/RED
WHT/GRY
BROWN
WHT/BRN
WHT/YEL
WHT/GRN
RED
BLACK
WHT/BLU
WHT/ORG
LED 1
3
2
10KΩ
POT 1
1
1 3 6 4 2 5
J4 (FRONT PANEL)
GREEN
CHANNEL 1

PPS 11 POWER SOURCES

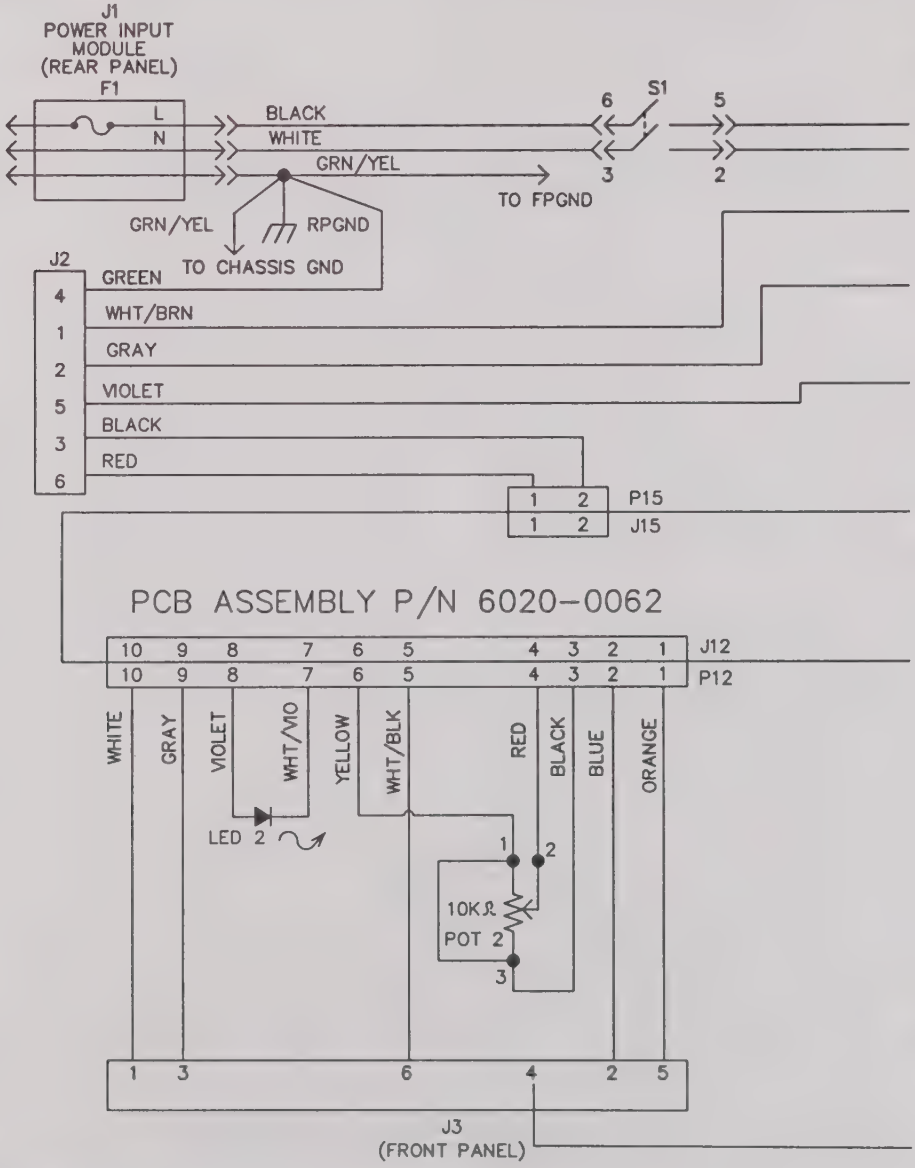
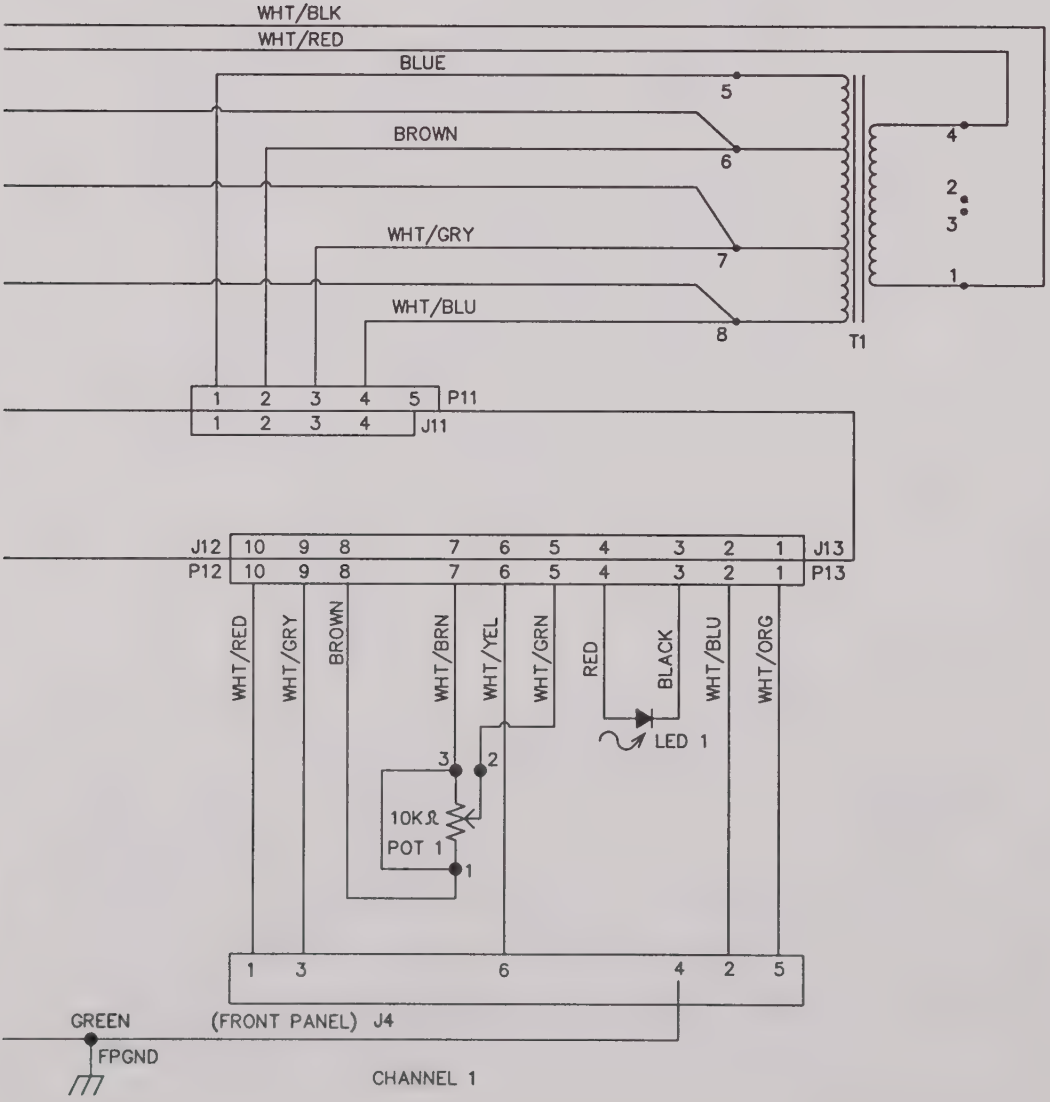
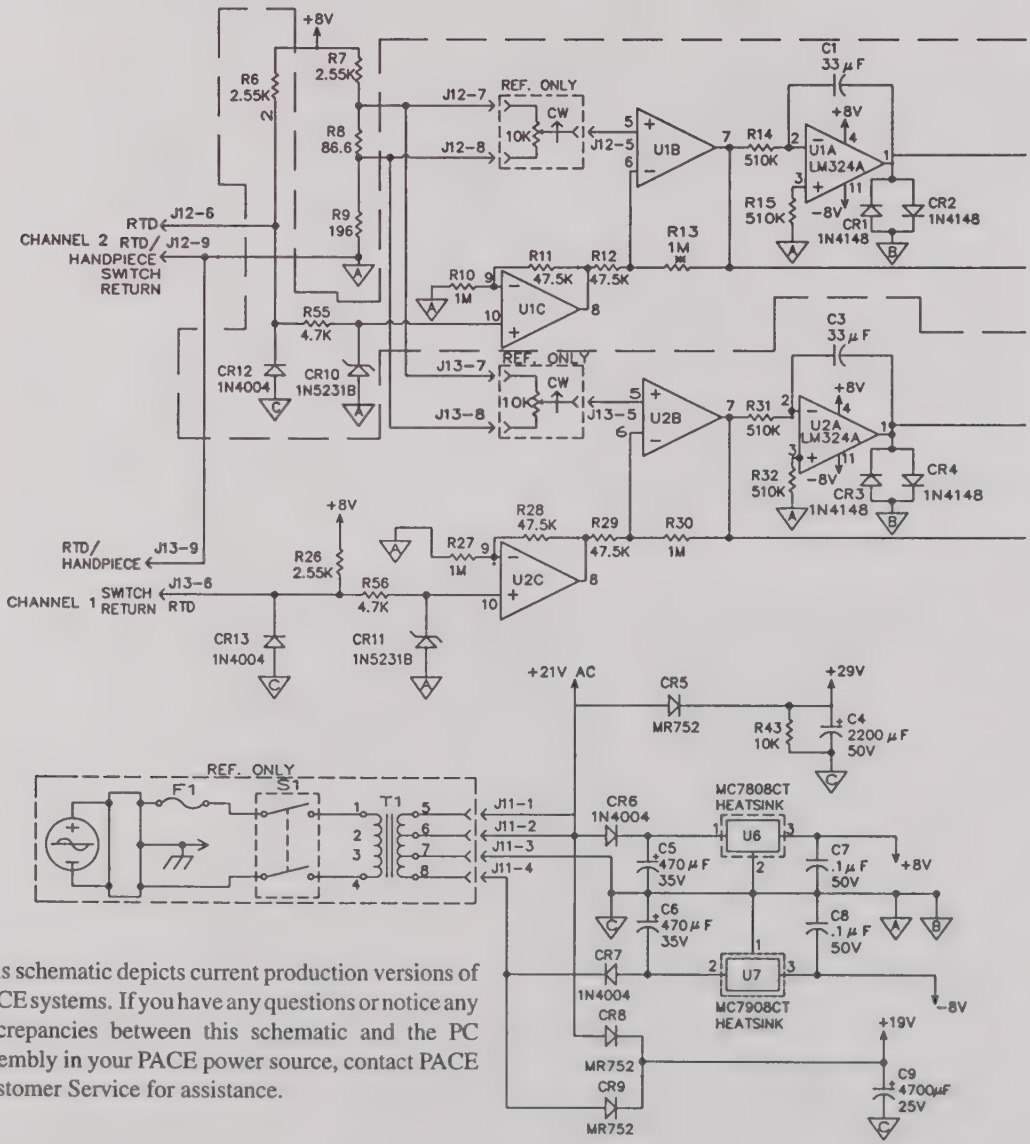


FIGURE 15. PPS 11 POWER SOURCES WIRING DIAGRAM

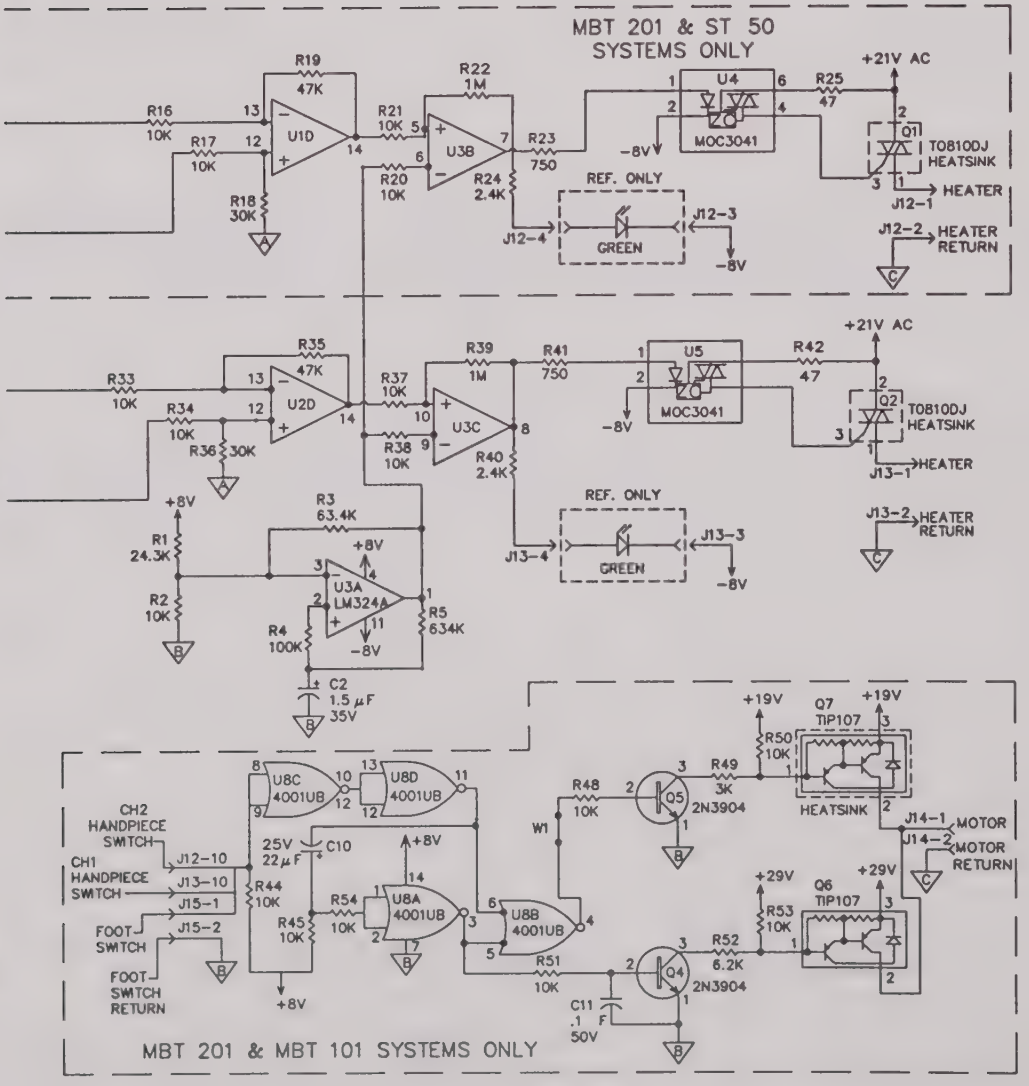

WHT/BLK
WHT/RED
BLUE
BROWN
WHT/GRY
WHT/BLU
5
6
7
8
4
2
3
1
T1
1 2 3 4 5 P11
1 2 3 4 J11
J12 10 9 8 7 6 5 4 3 2 1 J13
P12 10 9 8 7 6 5 4 3 2 1 P13
WHT/RED
WHT/GRY
BROWN
WHT/BRN
WHT/YEL
WHT/GRN
RED
BLACK
WHT/BLU
WHT/ORG
LED 1
3
2
10KΩ
POT 1
1
1 3 6 4 2 5
GREEN
(FRONT PANEL) J4
FPGND
CHANNEL 1

PCB ASSEMBLY SCHEMATIC



This schematic depicts current production versions of PACE systems. If you have any questions or notice any discrepancies between this schematic and the PC assembly in your PACE power source, contact PACE Customer Service for assistance.

FIGURE 16. PCB ASSEMBLY SCHEMATIC


MBT 201 & ST 50
SYSTEMS ONLY
R19
47K
R16
10K
R17
10K
R18
30K
U1D
R21
10K
R22
1M
U3B
R20
10K
R24
2.4K
R23
750
REF. ONLY
GREEN
J12-4
J12-3
-8V
U4
MOC3041
R25
47
+21V AC
Q1
T0810DJ
HEATSINK
HEATER
J12-1
J12-2
HEATER
RETURN
R35
47K
R33
10K
R34
10K
R36
30K
U2D
R37
10K
R38
10K
U3C
R39
1M
R41
750
R40
2.4K
REF. ONLY
GREEN
J13-4
J13-3
-8V
U5
MOC3041
R42
47
+21V AC
Q2
T0810DJ
HEATSINK
HEATER
J13-1
J13-2
HEATER
RETURN
+8V
R1
24.3K
R2
10K
R3
63.4K
U3A
LM324A
R4
100K
R5
634K
-8V
C2
1.5 µF
35V
CH2
HANDPIECE
SWITCH
CH1
HANDPIECE
SWITCH
FOOT
SWITCH
FOOT
SWITCH
RETURN
J12-10
J13-10
J15-1
J15-2
U8C
4001UB
U8D
4001UB
U8A
4001UB
U8B
4001UB
25V
22µF
C10
R44
10K
R45
10K
R54
10K
R51
10K
C11
.1 µF
50V
W1
R48
10K
Q5
2N3904
R49
3K
R50
10K
Q7
TIP107
HEATSINK
+19V
J14-1
MOTOR
J14-2
MOTOR
RETURN
R53
10K
Q6
TIP107
+29V
R52
6.2K
Q4
2N3904
MBT 201 & MBT 101 SYSTEMS ONLY

REPLACEMENT PARTS

POWER SOURCE

Listed below are the power source replacement parts which may be ordered directly from PACE sales or through your local authorized PACE distributor. Refer to Figure 1. To obtain any power source parts other than those listed below, contact PACE Customer Service directly at Tel. # (301) 490-9860 or Fax # (301) 604-9215.

ITEM NO.	DESCRIPTION	PACE PART NUMBER MBT 201 MBT 101	MBT 201J MBT 101J	MBT 201E MBT 101E
1	Power Switch	1157-0052	1157-0052	1157-0052
2	AC Power Receptacle/Fuse Holder	1207-0151	1207-0151	1207-0151
3	PCB Assembly (MBT 201/J/E)	6020-0061	6020-0061	6020-0061
	(MBT 101/J/E)	6020-0076	6020-0076	6020-0076
4	Motor Pump Assembly (MBT 201/J/E)*	1336-0024*	1336-0024*	1336-0024*
	(MBT 101/J/E)	1336-0029	1336-0029	1336-0029
5	Fuse (F1), 1.25A Time Lag (MBT 201, MBT 101/J)	1159-0217	1159-0251	- - - -
	0.63A Time Lag (MBT 201E, MBT 101E)	- - - -	- - - -	1159-0214
	1.60A Time Lag (MBT 201J)	- - - -	- - - -	1159-0256

TABLE III. MBT 201/101 POWER SOURCE REPLACEMENT PARTS

* **Current production MBT 201 systems incorporate the 1336-0029 Motor Pump Assembly.**

ITEM NO.	DESCRIPTION	PACE PART NUMBER		
		ST 50	ST 50J	ST 50E
1	Power Switch	1157-0052	1157-0052	1157-0052
2	AC Power Receptacle/Fuse Holder	1207-0151	1207-0151	1207-0151
3	PCB Assembly	6020-0062	6020-0062	6020-0062
4	Fuse (F1), 1.25A Time Lag (ST 50, ST 50J)	1159-0217	1159-0251	- - - -
	0.63A Time Lag (ST 50E)	- - - -	- - - -	1159-0214

TABLE IV. ST 50 POWER SOURCE REPLACEMENT PARTS

REPLACEMENT PARTS

HANDPIECES

Listed below are the handpiece replacement parts which may be ordered directly from PACE sales or through your local authorized PACE distributor. To obtain any handpiece parts other than those listed below, contact PACE Customer Service directly at Tel. # (301) 490-9860 or Fax # (301) 604-9215.

ITEM NO.	DESCRIPTION	PACE PART NUMBER
1	SX-70 Sodr-X-Tractor Handpiece	6010-0077-P1
2	Heater & Seal Assembly	6010-0080-P1
3	Glass Chamber	1265-0009-P1
4	Filter	1309-0018
5	Heater Set Screw	1348-0547
6	AdapTip	1360-0083-P1
7	SX-65A Sodr-X-Tractor Handpiece	6010-0073-P1
8	Heater & Seal Assembly	6010-0074-P1
9	Glass Chamber	1265-0009-P1
10	Filter	1309-0018
11	Heater Set Screw	1348-0547
12	IR-70 High Capacity SMT Thru-Hole Soldering Iron	6025-0009-P1
13	Heater Set Screw	1348-0547

TABLE V. HANDPIECE REPLACEMENT PARTS

ITEM NO.	DESCRIPTION	PACE PART NUMBER
1	TJ-70 Mini ThermoJet Handpiece	7023-0002-P1
2	Heater Assembly	6010-0084-P1
3	Heater Set Screw	1348-0547
4	TP-65 ThermoPik Handpiece	7024-0001-P1
5	Heater Assembly	6010-0081-P1
6	Heater Set Screw	1348-0547
7	Vacuum Cups	- - - - - - - - - -
8	4.4mm (0.175") O.D.	1121-0382-P5
9	7.6mm (0.300") O.D.	1121-0383-P5
10	12.7mm (0.500") O.D.	1121-0384-P5
11	TT-65 ThermoTweez Handpiece	7025-0001-P1
12	Heater Assembly	- - - - - - - - -
13	With Sensor	6010-0082-P1
14	Without Sensor	6010-0083-P1
15	Heater Set Screw	1348-0547
16	Tip Alignment Tool	1100-0234
17	Cushion Grip Kit	6993-0155
18	Replacement Pads For Cushion Grips	1317-0029-P2

TABLE V. CONT'D HANDPIECE REPLACEMENT PARTS

ACCESSORIES

Listed below is a partial listing of accessory replacement parts. For a complete, current listing of available parts, contact PACE sales or your local authorized PACE distributor.

ITEM NO.	DESCRIPTION	PACE PART NUMBER
1	Cleaning Station	6021-0006
2	Replacement Sponges	4021-0007
3	Fiber Cleaning Tool	1100-0232
4	Replacement Fiber Filler	1127-0013
5	Sponge Cleaning Tool	1100-0233
6	Replacement Sponge Filler	4021-0006
7	Cable Marker, Label Kit	6993-0136
8	Tubing, Clear PVC, .125" I.D. X 1" Long (Qty. 2)	1325-0003-07
9	Tubing, Translucent, .125" I.D. X 54" Long (Qty. 2)	1342-0001-13
10	Quick Disconnect Air Hose Fitting, Female	1259-0086
11	Quick Disconnect Air Hose Fitting, Male	1259-0087
12	VisiFilter	1309-0020
14	Power Cord (115 VAC & 100 VAC systems)	1332-0094
	(230 VAC systems)	1332-0093
15	Bristle Brush	1127-0002
16	Wire Brush, 3/16" Diameter	1127-0014
17	Wire Brush, 1/8" Diameter	1127-0006
18	Tip Cleaner Kit	6993-0151
19	Tip & Temperature Selection System	1257-0186-P1
20	Tip Redi-Rak	6021-0007
21	Foot Pedal	6008-0115
22	Dual Iron/Air Handpiece Cubby	6019-0033
23	Dual Air Handpiece Cubby	6019-0034
24	Replacement Sponge for Dual Handpiece Cubbies	4021-0005
25	ThermoTweez Cubby	6019-0035
26	ThermoPik Cubby (for use with large tips)	6019-0037
27	Power Source Interlock Kit	6993-0141

TABLE VI. ACCESSORY REPLACEMENT PARTS

MANUAL IMPROVEMENT & COMMENT FORM

Instructions

1. Duplicate this form and submit comments on the copy. Keep the original to make future comments.
2. Complete all requested information.
3. Submit completed form to:

PACE Incorporated
Applications Engineering
9893 Brewers Court
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Nature of Change (Identify page and paragraph and include proposed rewrite, if possible.)

Reason for Recommendation

Submitted by:

Name:	Company or Organization:
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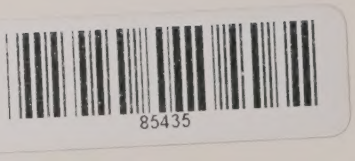
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